

## CLAIMS

1. An electron generator comprising:
  - 5 a cylindrical shell for containing a vacuum,
  - a series of openings in said shell extending around said shell,
  - 10 windows comprising a thin material positioned on and covering said openings and adapted to make said shell vacuum tight,
  - an electron emitting surface positioned within said shell adapted to generate energetic electrons along its length,
  - 15 focusing elements to direct generated electrons to travel to said windows whereby a substantial percentage of the generated energetic electrons strike and pass through said windows and exit said generator.
2. An electron generator in accordance with claim 1 in which said electron emitting surface is axially continuous through substantially the length of said shell.
- 25 3. An electron generator in accordance with claim 1 including a grid between said electron emitting surface and said shell to focus emitted electrons toward the openings in the shell,
4. An electron generator in accordance with claim 1 in which said windows comprise a metal foil.
- 30 5. An electron generator in accordance with claim 3 in which said openings extend circumferentially around said shell and said grid is slotted and positioned such that electrons emitted from the cathode substantially either are intercepted by the grid or pass through the slots and are focused on to the windows of said shell.
- 35 6. An electron generator in accordance with claim 1 in which the shell is liquid cooled.

7. An electron generator in accordance with claim 4 in which said windows comprises titanium.
8. An electron generator in accordance with claim 3 in which said electron emitting surface is a segmented dispenser cathode.
9. An electron generator in accordance with claim 3 in which said electron emitting surface is an oxide cathode.
- 10 10. An electron generator in accordance with claim 1 in which said electron emitting surface is a hot wire filament.
11. An electron generator in accordance with claim 3 in which said electron emitting surface is a cold electron emission device.
- 15 12. An electron generator in accordance with claim 1 in which foils of individual windows are bonded to the shell at the perimeters of the windows.
- 20 13. An electron generator in accordance with claim 12 in which said windows extend substantially around the cylinder in substantially a 360-degree arc.
14. An electron generator in accordance with claim 12 in which said windows extending around the cylinder cover less than 360 degrees.
- 25 15. An electron generator in accordance with claim 1 in which said windows are in the range of 0.0003" to several thousandths of an inch thick.
16. An electron generator in accordance with claim 1 in which the vacuum is continuously maintained during operation.
- 30 17. An electron generator in accordance with claim 1 in which an ion pump is attached to said generator, and the generator is pumped and baked and then pinched off downstream of the ion pump.

18. An electron generator in accordance with claim 1 in which the unit is pumped and baked and at the end of processing the unit is pinched off.
19. An electron generator in accordance with claim 1 in which the unit includes a getter within the vacuum.
20. An electron generator in accordance with claim 1 in which electrodes mounted internally within said electron source focus electrons emitted from said cathode to strike the windows in said cylindrical shell.
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21. An electron generator in accordance with claim 1 in which the cathode is mounted off center within the shell.
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22. An electron generator in accordance with claim 1 in which the slots of the tube vary in configuration and spacing from one to another to compensate for electron optic aberrations within the tube and to enhance the output of energetic electrons from the tube.
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23. A gas cleanup system to remove toxics from a gas flowing through the system comprising an electron generator positioned within a housing to emit energetic electrons circumferentially in a zone within said housing and an intake into said housing to flow a gas to be treated through said housing and through said zone and out of said housing.

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